Undergraduate Catalog of Courses

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Environmental Science and Studies Programs

Saint Mary's College of California

ENVIRONMENTAL SCIENCE AND STUDIES PROGRAMS

The Environmental Science and Studies programs instill in students knowledge from many disciplines. This knowledge is applied to the study and management of the environment. Students examine the structure, function, and dynamics of ecosystems, the interaction between physical and living systems, and how human enterprise is adversely affecting environmental quality. They explore how environmental degradation and pollution can be lessened or prevented by the application of sound management principles derived from ecological theory. In the study of the environment, students obtain the satisfaction of working toward an understanding of the natural systems around them, the opportunity to acquire the skills necessary to participate in the solution of serious environmental problems and the insights essential to a successful search for rational alternatives to present forms of ecosystem mismanagement. The programs foster critical thinking and holistic ways of knowing, and offer a variety of specific approaches—from the experimental protocols of the natural sciences to ones that are similar to those of the social sciences and humanities. It seeks to achieve a balance between the empirical and normative aspects of environmental study. The bachelor of arts program involves less scientific rigor than the bachelor of science and places more emphasis on the social sciences, humanities and the arts.

The location of Saint Mary's College, near urban and suburban centers as well as a diversity of natural areas including tidal, freshwater, estuarine, and marine systems; a delta; mountains; lakes; deserts; forests; valleys and scrub lands, allows access to an impressive array of study sites ranging from the relatively undisturbed to the severely impacted. Internships are available to offer first-hand experience in a variety of fields.

FACULTY

William E. Perkins, Ph. D., *Director of Environmental Science and Studies Program*
Roy Allen, Ph.D., *Professor of Economics (Natural Resource Economics and Human Ecology)*
Steven Bachofer, Ph.D., *Professor of Chemistry (Environmental Chemistry)*
Carla C. Bossard, Ph.D., *Professor of Biology (Plant Science, Ecology, Terrestrial Systems)*
Michael Black, Ph.D., *Professor of Political Science*
Glenna Breslin, Ph.D., *Professor of English (Nature Writing)*
Joel D. Burley, Ph.D., *Associate Professor of Chemistry (Atmospheric Chemistry, Environmental Chemistry)*
Gerard M. Capriulo, Ph.D., *Fletcher Jones Professor of Biology (Marine Science, Ecology, Invertebrates)*
Lawrence R. Cory, Ph.D., *Professor of Biology (Evolution, Environmental Perturbations)*
John Ely, Ph.D., *Associate Professor of Sociology and Anthropology (Society and the Environment)*
Brian Jersky, *Professor of Mathematics (Biostatistics)*
Philip Leitner, Ph.D., *Professor of Biology (Desert Ecology, Animal Physiological Adaptations)*
Gretchen Lemke-Santangelo, Ph.D., *Professor of History (U.S. Environmental History)*
Douglas Long, Ph.D., *Adjunct in Biology (Animal Behavior)*
Lidia R. Luquet, Ph.D., *Associate Professor of Mathematics (Environmental Systems and Biological Modeling)*
Asbjorn Moseidjord, Ph.D., *Associate Professor of Economics (Environmental Economics)*
Micah Muscolino, Ph.D., *Assistant Professor of History (Environmental History of China and War)*
Ronald P. Olowin, Ph.D., *Professor of Physics and Astronomy (Geosciences, Environmental Modeling, Astronomy)*
Roy Wensley, Ph.D., *Professor of Physics and Astronomy (Computational and Ecosystem Modeling)*

LEARNING OUTCOMES

When students complete the Environmental Science and Studies programs, they will be able to:

- **RECALL** and synthesize the knowledge derived from biology, chemistry, physics, earth science, economics, and political science to better understand the earth's environment.
- **COMPREHEND** environmental problems from multiple perspectives.
- **EVALUATE** the credibility of varying sources of information on environment.
- **DISPLAY** cognizance of ethical considerations and be mindful of them when constructing solutions to environmental problems.
- **RECOGNIZE** the interconnectedness of earth's ecosystems and human dependence on them.
- **COMMUNICATE** skillfully, in organizing and presenting a seminar, in writing a scientific report of research findings, and in designing a visual presentation regarding environmental findings.
- **KNOW** how to find information from library sources, original scientific literature, and from the Internet on environmental topics.
- **DEMONSTRATE** competence in using the basic types of equipment utilized in gathering information on the environment.
- **RECOGNIZE** processes and patterns of environmental interactions.

CURRICULUM AND COURSE REQUIREMENTS

The Environmental Science and Studies programs have two avenues of study: one, a less scientifically rigorous program, leading to the bachelor of arts degree and the other, to the bachelor of science degree which offers two areas of concentration: the environmental biology and earth sciences concentration and the environmental chemistry concentration.

The bachelor of science major requires completion of 18 courses; the bachelor of arts requires completion of 14. Also, the Environmental Science and Studies program hosts an ongoing seminar series with three presentations per year, coordinated by the program director. This series includes broad areas of interest related to the environment, from poetry to science, and will include field trips to sites of interest on occasion. All majors in the program will be required to attend at least six of these special events in addition to their course requirements. All environmental science and studies majors will also be required to do either a research internship or a senior research thesis (such as the ongoing summer research program in the School of Science) or a senior project.

ENVIRONMENTAL SCIENCE MAJOR

ENVIRONMENTAL BIOLOGY AND EARTH SCIENCE CONCENTRATION

Required: 18 courses and senior project

TEN REQUIRED LOWER DIVISION COURSES

Math 27 Calculus 1 or Math 13 and 14 to equal Math 27
Math 28 Calculus 2
Phys 10-11 General Physics 1 or Phys1-2 General Physics 1
Phys 20-21 General Physics 1 or Phys 3-4 General Physics 2
Biol 90-91 Diversity
Biol 92-93 Cell and Molecular
Chem 8-9 General Chemistry 1
Chem 10-11 General Chemistry 2
EES 40 Geology and the Earth or EES 100 Hydrology
EES 92 Environmental Science

EIGHT UPPER-DIVISION COURSES

Five required courses

Biol 119 Research Design and Biostatistics
Biol 125 Ecology
Econ 150 Environmental Economics or Econ 4 Macro-economics or Econ 100 Issues and Topics in Economics
EES 110 Geographic Info Systems or Chem Environ Chem
Pol 135 Environmental Politics or Pol 136 Enviromental Law and Regulation

Three electives from the following
Biol 113 Marine Biology
Biol 114 Marine Ecology
Biol 142 Cal Flora
Biol 144 General Botany
Biol 146 Plant Ecophysiology
Biol 152 Conservation Science
Biol 197/199 Independent Research
EES 100 Hydrology
EES 140 Environmental Geology

Senior Project
EES 197 Special Studies

ENVIRONMENTAL CHEMISTRY CONCENTRATION

Required: 18 Courses and a Senior Project

TEN REQUIRED LOWER-DIVISION COURSES

Math 27 Calculus 1 or Math 13 and 14 to equal Math 27
Math 28 Calculus 2
Phys 10-11 General Physics 1 or Phys1-2 General Physics 1
Phys 20-21 General Physics 1 or Phys 3-4 General Physics 2
Biol 90-91 Diversity
Biol 92-93 Cell and Molecular
Chem 8-9 General Chemistry 1
Chem 10-11 General Chemistry 2
EES 40 Geology and the Earth
EES 92 Environmental Science

EIGHT UPPER-DIVISION COURSES

Six required courses
Biol 125 Ecology
Chem 104 Organic Chemistry 1
Chem 106 Organic Chemistry 2
Chem 108 Separation & Ident or Chem 118 Instrumental Chem
Chem 119 Environmental Chemistry
Pol 135 Envir. Politics or Pol 136 Envir. Law and Regulation

Two of the following
Biol 114 Marine Ecology
Biol 135 Biochemistry
Biol 144 General Botany
Biol 146 Plant Ecophysiology
Biol 152 Conservation Science
Chem 130 Advanced Inorganic Chemistry
Chem 197 or 199 Independent Research
EES 100 Hydrology
EES 110 Geographic Information Systems
EES 140 Environmental Geology

Senior Project or Research Internship
EES 197 Special Studies

ENVIRONMENTAL STUDIES MAJOR

Required: 14 courses and a senior project

Five required courses

Biol 90-91 Diversity
Biol 125 Ecology
Chem 20 Concepts in Chem or Chem 2-3 Principles in Chem
EES 92 Environmental Science
Politics 100 Research Methods or AnthroSoc 132 Research Methods or Biol 119 Research Design and Biostatistics

Three electives from the following:

Biol 55 Ocean World
EES 40 Geology and the Earth
Biol 113 Marine Biology
Biol 142 Cal Flora
Biol 144 General Botany
Biol 146 Plant Ecophysiology
Biol 152 Conservation Biology
EES 100 Hydrology
EES 140 Environmental Geology

Six electives from the following:

Biol 52 Symbiotic Universe
Bus 181 Ethical, Social and Political Issues in Business
Econ 100 Issues and Topics in Economics
Econ 150 Environmental Economics
Eng 140 Nature Writing
EES 110 Geographic Information Systems
Hist 130 Environmental History
Hist 150 Latin American Environmental History
Lib Study 122 Nature and the Sacred
Phil 117 Philosophy of Nature
Phil 170 Environmental Ethics
Pol 135 Environmental Politics
Pol 136 Environmental Law and Regulation
Sociology 134 Society and the Environment

Senior project

EES 197 Special Studies or other departmental 197 courses

ENVIRONMENTAL SCIENCE AND STUDIES PROGRAM — MINORS

MINOR IN ENVIRONMENTAL STUDIES

Eight courses

Biol 90-91 Diversity
Chem 20 Concepts in Chemistry or EES 60/61
Biol 125 Ecology
EES 92 Environmental Science
Four social science/humanities courses from the major electives

MINOR IN ENVIRONMENTAL SCIENCE

Six courses

Biol 90-91 Diversity
EES 92 Environmental Science

One of the following

EES 40 Geology and the Earth
EES 100 Hydrology
Chem 20 Concepts in Chemistry or EES 60/61

One of the following

Biol 113 Marine Biology
Biol 142 Cal Flora
Biol 144 Botany
Biol 146 Ecophysiology

Two of the following

Biol 119 Research Design and Biostatistics
Biol 125 Ecology
Biol 142 Cal Flora
Biol 152 Conservation Science
EES 110 Geographic Information Systems

MINOR IN EARTH SCIENCE

New environmental science and studies minor for those students who desire greater exposure to the earth sciences.
Five Courses

EES 40 Geology and the Earth
EES 50 Historical Geology
EES 100 Hydrology
EES 110 Geographic Information Systems
EES 140 Environmental Geology